

Special Article

MEDICAL OBSERVATIONS AND PROBLEMS IN THE CANADIAN ARCTIC*

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PART II

NUTRITION AND NUTRITIONAL DEFICIENCIES

ESKIMOS as well as Northern Indians used to live, as hunters, on a diet consisting almost exclusively of meat, fish and fat. The only source of carbohydrates of practical importance was large amounts of berries collected by their women and children in the short summers. Indians used to dry enough berries for an all-year-round supply of this important vitamin and mineral source, while Eskimos preserved only a limited amount by freezing them in the fall. Eskimos also cherished another source of fresh vegetables, the stomach contents of game, especially land mammals. In June and July the young leaves of a number of tundra herbs are collected and eaten with seal meat and blubber. Similar use is made of certain algæ (seaweed). For the greater part of the long winter no vegetables or berries are available to Eskimos, yet vitamin or other deficiencies are unknown so long as a large part of their diet consists of fresh meat and fish, mostly eaten raw and frozen. Indeed nothing is more vitalizing and more delicious—at least to my taste after months of canned meat—than frozen seal and caribou meat or Arctic char on an exhausting dog-team trip.

It has been claimed that *vitamin A deficiency* is to blame for corneal keratitis and opacities in the North (see section on phlyctenular keratoconjunctivitis in Part I). Vitamin A is, however, not scarce but rather abundant in the Arctic. All fish and sea mammals as well as their predators contain large concentrations of it; in fact, recent investigations have proven that, for example, the livers of polar bears, tabooed by Eskimos and known as poisonous to Arctic explorers, do not contain a specific poison, but only a poisonous concentration of vitamin A. Sled dogs tolerate small pieces of polar bear liver, but will lose their hair if given larger quantities. Squareflipper seal liver seems to contain even more vitamin A, as dogs show similar but more severe symptoms after eating small pieces of it. Many seal-eating Eskimos, though perfectly healthy, have a relatively large liver. This hepatomegaly was first described by Brown¹⁰ and confirmed by Hildes.¹¹ Brown ascribed it to their high vitamin A intake, which is believed to facilitate cold acclimatization.

Vitamin B complex deficiencies were seen to some degree around trading posts, where large amounts of flour and sugar were consumed, but they have completely disappeared since the sale of flour enriched with vitamin B became obligatory in the

N.W.T. One would expect *vitamin C* deficiency to be prevalent in the North, since so many Arctic explorers died of scurvy, but it is actually never seen in people eating adequate amounts of fresh meat. Slight degrees, manifested as ready bleeding of the gums, occur occasionally after periods of relative scarcity of fresh meat. Despite the long dark winters and inadequate ultraviolet radiation at all times, *vitamin D* deficiencies do not occur in Arctic peoples who live predominantly on native food and whose children are breast-fed. Severe degrees of *scurvy as well as rickets* are to be seen in *bottle-fed* children, who are not given vitamin supplements.

We had an orphan girl in Pangnirtung, who was reared by the missionary's wife on powdered milk 25 years ago. The girl ended up with a rachitic contracted pelvis. I had eventually to deliver her large first son by Cæsarean section, the first Eskimo—to my knowledge—born that way within the Arctic, under most trying conditions.

Vitamin preparations have been distributed in small amounts to everyone reached by surveys and by nursing stations. It would appear from the aforesaid to be more useful, perhaps, to reserve the often limited supply for those people who eat much "white man's food" and to supplement particularly the vitamin intake of children who are fully or partly bottle-fed, and those breast-fed ones whose mothers do not eat enough fresh meat.

The early mouth-to-mouth feeding of small amounts of pre-masticated meat and fish, boiled as well as raw, may be another effective factor preventing scurvy and rickets and providing all important nutritional elements including iron. This is started in breast-fed babies usually at four to five months, to be followed later, when the baby has enough teeth, with small morsels of fish and meat. The bulk of nutrition, however, is derived from the mother's milk until the next baby takes, after about three years, its place on the breast. I have seen several well-developed Eskimos, adults and children, who were pointed out to me as having been exclusively brought up with mouth-to-mouth feeding from the very first weeks of life, after losing their mother post partum or being given away as a twin (an Eskimo woman can keep only one of twin babies, for there is only room for one in her parka).

No *mineral deficiencies* are known to exist in Eskimos. I regularly examined the hæmoglobin level of pregnant women but finally discontinued the practice, as well as the doling out of the customary calcium, iron and vitamin pills for pregnant women, in those camps where a good deal of fresh meat was consumed. My own findings in Aklavik and Pangnirtung and reports from Alaska⁵ and from the Canadian Eastern Arctic¹¹ show a remarkable uniformity. No cases of anæmia were detected except in rare instances after gross hæmorrhage or in patients with advanced tuberculosis or cancer. The mean hæmoglobin values were in each series for male adults, between 15 and 16 g. %; female adults, between 14 and 15 g. %; children, at or above values regarded as normal for respective age groups. In contrast, Indians, in particular Indian children, have been

*This paper expresses the personal views of the author, which are not necessarily shared by the Indian and Northern Health Services.

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found to be slightly to moderately anæmic in Alaska,⁵ and I found the same situation in the lower Mackenzie district. This is probably due to extensive bannock feeding, often supplemented only by fish.

DISEASES OF "DEGENERATION AND CIVILIZATION"

Until quite recently the natives of the Americas were regarded as being free of "degeneration and civilization" diseases, such as arteriosclerotic cardiovascular diseases, diabetes mellitus, thyrotoxicosis, peptic ulcer, ulcerative colitis, bronchial asthma and also neoplastic diseases. Closer examination has shown this to be only partly true in Eskimos as in other primitive peoples. Changing living conditions and increasing life expectancy also influence the incidence of such diseases. There remain, however, significant differences. Data collected in the Charles Camsell Indian Hospital, Edmonton, the Mountain Sanatorium, Hamilton,¹² and different Manitoba hospitals,¹³ on native patients evacuated from the North, and my own experience in the Arctic, indicate that most disorders of neuro-hormonal regulation, psychosomatic diseases, essential hypertension, presenile arteriosclerosis and some forms of neoplastic diseases have never been observed in pure-blooded Eskimos and Athabaskan Indians, living in the old native fashion. The rapidly changing conditions in the Canadian Arctic provide a unique opportunity to study the influence of civilization upon our health and to differentiate between racial-hereditary, dietary and social-psychological factors in the pathogenesis of these diseases, which are of growing importance for all of us.

(a) *Arteriosclerotic and hypertensive cardiovascular* diseases are now the most frequent causes of death in countries with "Western civilization". They are, at present, intensively studied and discussed, with occasional contradictory references to pertinent conditions and diets found in Eskimos. Arteriosclerosis and related complications like coronary atherosclerosis and cerebrovascular accidents definitely occur in Eskimos in old age, as clinical experience and postmortem findings have shown. I remember a man, about 80 years old, with a coronary thrombosis confirmed by autopsy; another one of about 75 with a complete A-V heart block, and one of 70 with a stroke. My impression after having examined more than 4000 Canadian Eskimos, however, is that arteriosclerosis is less common in old Eskimos than in old whites and does not appear to exist in Eskimos under 60 years of age. Only six pure-blooded adult Eskimos were included in my autopsies performed in the North, and this small number does not allow any conclusions regarding the actual incidence of arteriosclerosis. I, therefore, asked the opinion of the two pathologists with probably the greatest autopsy experience of Eskimos—at least in Canada. Dr. S. Hanson,¹⁴ reviewing approximately 30 autopsies of Western Arctic Eskimos performed at the Charles Camsell Indian Hospital, felt that no marked difference between old (above 60) Eskimos and old whites existed as regards the state of their vessels. For the middle and younger age groups, however, he was prepared to state that he had never been able to find any presenile pathological

changes in arterial walls. Dr. H. H. Lucke¹⁵ evaluated 17 postmortem examinations of Eastern Arctic Eskimos, performed at Mountain Sanatorium, Hamilton, Ontario. He agrees with Dr. Hanson that atherosclerosis occurs in Eskimos over 60, but found it less extensive and severe than in Caucasians of the same age group.

Keys *et al.*¹⁶ have collected convincing experimental and statistical evidence that cholesterolaemia and fat-rich diets parallel the incidence of arteriosclerosis in different peoples. This has been questioned, and health conditions and diets prevailing in Eskimos have been cited to disprove such a connection.¹⁷ The fats eaten by Eskimos are usually simply described as "animal" fats. This is a misleading simplification, at least as far as Eskimos are concerned. With the exception of the numerically small and insufficiently examined group of Caribou or Inland Eskimos, they live predominantly on sea mammals and fish. These contain *marine fats*, which are rich in *unsaturated* fatty acids (fish oil, seal oil) and are often shunned by whites for their repugnant smell. We seem to have lost the healthy instincts and natural senses of primitive peoples, who often crave rancid oxygenated (unsaturated) fats. Baffin Island Eskimos have a special treat in summer, namely, Arctic char (a species of salmon with an extraordinarily high fat content) sewn raw into sealskins and exposed to the sun for two to three days. By fermentation and oxidation, they thus instinctively enrich the unsaturation of the fatty acids. Similar dietary customs are known to exist among the older Chinese and other peoples.

The old Eskimo in Pangnirtung, whom I told about the artificial hardening (saturation) and deodorization of white whale oil for margarine production in Montreal, was perhaps not far from the truth, when he mused: "White men can do almost everything, but they do not seem to have good sense, for taking the smell away from fat takes all the goodness out of it."

I have no experience with the Caribou Eskimos, but I have examined many Northern Athabaskan Indians, who lived on a similar diet of caribou meat and fish. They showed no markedly higher incidence of arteriosclerosis than Eskimos. Caribou meat is known for its relatively low fat content, and it is—even in good times—available for only a few months each year, while fish is plentiful most of the time and therefore actually constitutes the main nutritional basis for the "caribou" peoples.

Hypertensive cardiovascular diseases are practically absent in Eskimos and Northern Indians. I remember only two cases with diastolic blood pressure values above 100 mm. Hg. One of these cases had renal tuberculosis with blocking of one ureter. The other was suspected of having had chronic pyelonephritis for years.

Continental workers have always claimed that high salt intake would favour the development of hypertension. Theoretical and experimental support for this view has been presented by Selye. Dahl¹⁸ has collected overwhelming evidence from the literature as well as from his own investigations for the role of high salt intake in the development of essential hypertension. Eskimos have a natural aversion against our salty food. They do not,

however, obtain their salt exclusively from meat, as assumed by Dahl, but achieve at least slight seasoning by adding about one-quarter seawater to the water in which they boil their meat. Nevertheless, the total salt intake is, in my opinion, less than Dahl's estimated 3-4 grams a day, as they almost never consume the maximal amounts of meat allowed by him.

Important as diet may be as a contributing factor in the pathogenesis of arteriosclerosis and hypertension, it is probably overshadowed by factors of neuro-hormonal and neuro-vascular regulations, the balance of which seems often disturbed by the stress, frustration and constant pressures of our modern way of life. It is certainly wrong to assume that primitive people are not subjected to stress and pressure. I doubt if there is, or ever was, a carefree paradise for any people in this world. Certainly not for Eskimos, living under such hardships and constant threats to their very existence. Why and how, then, do stress and pressure exert pathological effects in our modern society? I have witnessed many examples of stress situations, including emotional pressures, in truly primitive peoples. These almost invariably led to an irresistible urge for increased and sometimes wild motor activity, which is the natural solution to stress, as stress evokes in animal physiology an increased readiness for motor action—to fight or flight. Our modern society has largely lost the habit or possibility for the motor "work-out" of stress, while being constantly flogged by sensory overstimulation. Another important causative factor, providing much frustration and sustained mental stress, seems to me to be our loss of the genuine readiness of primitive peoples to modestly accept fate and our natural place in the world without ambitious revolting. But all these factors may merely influence the manifestation of pathological conditions, which are largely determined by hereditary patterns, as Page *et al.*¹⁹ have demonstrated for the low incidence of coronary disease in Navajo Indians.

(b) *Psychosomatic and neuro-hormonal dysregulation diseases.*—There are, as yet, no cases on record of *peptic ulcer* occurring in Canadian Eskimos. I would like to report a case history which shows what we may expect in future more frequently as a result of increasing problems of civilization:

A 19-year-old Eskimo girl, who had spent several years in the South, first as a patient and then in training, was torn between nostalgia for home and the mounting fear of being unable to cope with life there and of being ridiculed by her people for having lost or never learned the skill to make sealskin boots and skin clothing. We tried to make the transition easier for her in a small institution in the Eastern Arctic. But when she had difficulties in finding her right place among the partly white, partly Eskimo staff, she responded first with a gynaecological organ-neurosis, thus transferring her problems back to an area where an irresponsible white man had first disturbed her native balance when she was only 14 years old. Later, she developed typical stomach ulcer symptoms. The specific choice of this organ may have been provoked by the general tension and feeling

of insecurity arising from the girl's and the management's indecision as to whether she should take her place at the dining table for white or Eskimo personnel. My psychotherapeutic efforts were only partly successful, but she lost all symptoms when some of our Eskimo girls befriended her and taught her how to cut and sew her own parka and sealskin boots.

True *bronchial asthma* has never been seen in pureblooded Eskimos and Northern Indians. This is remarkable, as recurrent bronchitis and allergic reactions, both believed to be contributing factors to the pathogenesis of asthma, are quite often found in Eskimos. Although they generally have very deep, "barrel"-shaped, mighty thoraces, true emphysema is not very common despite the frequent irritation of the bronchi by the extreme cold. Urticaria and angioneurotic oedema were seen on several occasions, and allergic reactions to streptomycin were not uncommon. But the central psychosomatic factor and pathogenetic pathway producing typical asthma attacks just does not seem to exist in our Northern natives—yet.

To date no cases of *Graves's disease* or of clinically evident *hyperthyroidism* have been described in Eskimos.

I learned recently of a patient with a colloid goitre, who comes originally from Inland Eskimo stock south-east of Coppermine. He had a large thoracoplasty several years ago and was now readmitted for questionable reactivation of his pulmonary tuberculosis. He denied any thyroid symptoms and claimed to have had the goitre since his youth. But his thyroid function was investigated: B.M.R. plus 20; P.B.I. within, I¹³¹ uptake and conversion rates above, normal range. He was given a therapeutic dose of radioactive iodine. The pulse rate remained unchanged (pulmonary causes? he was dyspnoeic on exertion). I¹³¹ figures can be elevated in iodine-deficient goitres during the hyperplastic phase. I feel that this Eskimo is not suitable to be described as a first case of Graves's disease in Eskimos. More metabolic studies of Eskimos are necessary before we can classify certain laboratory findings as "abnormal" in Eskimos. If the results of Queen's University Arctic Expeditions 1949 and 1950 can be confirmed and Brown's¹⁰ theory is right, that a relative hyperthyroidism is part of the Eskimo's cold adaptation mechanism, then, indeed one should be most careful before attempting "normalization".

Contradictory findings on basal metabolism analyses have, however, been reported. Rabinowitch and Smith found an average B.M.R. elevation of plus 26% in the Eastern Arctic. But they examined subjects during the hectic days of ship-time, when most Eskimos work or feast day and night, with great excitement and very little sleep. Levine, working in Alaska under more suitable conditions, found no significant deviations from normal values. Brown *et al.*¹⁰ found in Southampton Island Eskimos an average elevation of plus 27% during the second week of July and of plus 21% at the end of August. Brown concludes that the small but significant drop during the summer weeks may represent an adaptation to warmer conditions and may suggest much higher metabolic rates prevailing in winter as part of cold adaptation.

Having lived with Eskimos through all seasons for four years, I find it difficult to follow these conclusions

for the following reasons. Early July is a time of much feasting and little sleep. Sea mammals, fish, fowl and fowl eggs are plentiful then and eaten in great quantities. We were impressed year after year by the seasonal restlessness overcoming natives in late spring and early summer, when hunting or feasting go on through most nights. They then tend to lose weight. In contrast, they usually grow round and fat, sleeping 12 or more hours daily, in the often lean early winter months. In July, Eskimos are often found sweating profusely and actually suffering from the "heat". In August, nights are less bright and "hot", allowing more night rest. Pulse rate and blood pressure amplitude, which are good clinical indicators of thyroid activity, were found perfectly normal in Eskimos. I had no means to measure B.M.R., P.B.I., I^{131} uptake and conversion. Such tests should be carried out during all seasons in suitable places such as Cambridge Bay or Frobisher Bay.

The perfect functional balance of the entire hormonal system is probably best demonstrated by the striking reliability of the interwoven functions of *lactation stimulation and ovulation suppression*.

Birth control is unknown to Eskimos, but their children are born evenly spaced, mostly three years apart. This amazingly uniform pattern becomes less regular in families employed by whites and in those living around the trading posts, where the intervals often shrink to two years and less. The intervals have become particularly short in Aklavik, Tuktoyaktuk and Frobisher Bay recently, where the population lives largely on "white man's food". A similar development was noticed in Alaska. American authors referred to the "influence of higher carbohydrate intake on the fertility rate of Eskimos", postulating scarcity of certain fertility factors in their exclusively meat and fat diet. I was more impressed by the close parallelism of the increasing bottle and Pablum feeding in infants and shortening of the intervals between pregnancies, which was not discussed in the Alaskan report. Milk powder and Pablum are available in the first place to those who can also buy flour and sugar. Vital statistics show a great rise in birth rates in recent years, even in those Indian and Eskimo communities where flour and sugar have been used widely for 50 or more years. The changing factor was apparently not introduction of carbohydrates, but shortening or abolishing of lactation, which is a more recent development. My view is supported by observations in South African natives, who showed a similarly changing fertility pattern with decreasing length of breast feeding.

I made a family list of all Eskimo camps in the Cumberland Sound and Davis Strait (E6-) district in Baffin Island, and this demonstrates the increasing birth rate and the decreasing regularity of birth intervals as one approaches Pangnirtung, the district's trading post. A typical family list from a remote camp is the following: KOAGA, husband, b. 1919; MARY, wife, b. 1923; children born 1939, 1942, 1946, 1949, 1952, 1956. Many families reflected the high infantile mortality rate by one or more intervals of 4-6 years. The few siblings less than two years apart all belonged to families employed

by whites. I was first inclined to regard such reliable suppression of ovulation during the first 2-2½ years of lactation as a racial characteristic. It certainly does not seem to be very dependable in white women. But no remarkable difference in the gestation intervals of pure-blooded Eskimo women and those of mixed blood was evident as long as they lived in a truly native manner. The important factor appeared to be that the children be really fully breast-fed with only some pre-chewed meat added later in infancy.

Diabetes mellitus is another endocrine and metabolic disorder which does not appear to exist in pure-blooded Eskimos, living on their native diet. I have carefully searched for cases, but could not find one during four years of medical activity in the Arctic. But even under hospital conditions with the sudden change to a high carbohydrate diet, no diabetes has been found so far in Eastern Arctic Eskimos.¹² Three Western Arctic Eskimos, patients in the Charles Camsell Hospital, have been discussed as possible cases. None of them presented a clinical picture of frank diabetes mellitus. The findings of occasional glycosuria and slightly elevated or borderline glucose tolerance tests were inconsistent. Most fasting blood sugars also were normal, some subnormal. One of these "diabetes" cases had terminal carcinoma of the vagina with cachexia, another a severe long-standing osteomyelitis, at the time of the slightly abnormal laboratory results. There remains only a 50-60 year-old Eskimo woman from Coppermine with a truly pathological glucose tolerance test under admissible conditions. I do not know, however, whether we can classify her as a true diabetic. She managed to maintain perfectly normal blood sugar and urine conditions as long as sudden peaks of carbohydrate intake were avoided. Pathological results of glucose tolerance tests are known to be found in normal whites after weeks of carbohydrate starvation. This must be considered when examining Eskimos. Our old Eskimo lady had not yet learned to react to an unphysiological carbohydrate peak within *our* normal standards, even after several months of eating our mixed diet, but is that really pathological after a lifetime on meat and fat? Old age brings shrinking elasticity not only of forms but also of physiological functions and adaptation potentials. I am indeed surprised that we do not find many more old Eskimos with mild diabetes as a result of the great dietary changes during the last years in the Canadian Arctic. Careful studies may reveal during the coming years whether racial or dietary factors are responsible for the conspicuous absence or rarity of diabetes mellitus in Eskimos.

A survey of public health conditions in Alaska²² discovered 44 new diabetes cases in 15,000 Indians but none in 16,000 Eskimos. The two races were thought to have been screened to a comparable extent during the five-year survey period, which lends significance to the finding of such a strikingly different incidence. Scott and Griffith²⁰ examined the blood sugars of 869 Eskimos serving as National Guardsmen, as well as 173 men and 185 women older than 35 in the six largest Eskimo settlements in Alaska. They found only three persons with elevated blood sugars. Two of these were half-

whites and the third was a 58-year-old woman with a slightly prolonged tolerance curve. The diagnosis "diabetes mellitus" has so far been made in five Alaskan Eskimos in hospitals. Only three of these could be confirmed, all from the vicinity of Nome, where many Eskimos of mixed origin are living.

Gout is unknown in Eskimos and Northern Indians despite their purine-rich diet. No other diseases due to inborn metabolic errors have been found.

(c) *Neoplastic diseases* do occur, but they are less common and of different type-prevalence than in whites. For example, cancer of the breast, one of the commonest malignancies in white females, has not yet been proven in pure-blooded Eskimos. There were single cases reported from Labrador (half whites) and from Ungava Bay, but neither case was confirmed by a pathological report.¹⁷ We have learned in the Charles Camsell Indian Hospital how careful one should be with the diagnosis of breast cancer in Eskimos, as in two cases this diagnosis was made by competent surgeons, and tuberculosis of the breast was proven by histological examination. There appears to be a conspicuous increase of breast cancer in Indians exposed for several decades to "white man's" habits, i.e. unphysiologically short lactation periods or even "drying up" of the breasts with oestrogens. Similar observations have been made in Bantus in South Africa, and in women living in "civilized" cultures the incidence of mammary cancer has increased as breast feeding has declined.²³ The conspicuous absence of this type of malignancy, which seems especially influenced by endocrine factors (and likely also by the unnatural disuse of stimulated glands), reflects again the ideal hormonal balance in Eskimos and other primitive peoples.

Lung carcinoma: If smoking alone causes lung cancer, we should expect to find many cases in Eskimos and Indians, who almost all smoke quite heavily, mostly cigarettes in recent decades. No bronchogenic cancer has been found, however, in Northern natives by our x-ray survey teams, now regularly combing the Mackenzie district and the Eastern and Western Arctic, or in the Charles Camsell Hospital and Mountain Sanatorium.¹² While lung cancer has been found in Southern Indians, it is not known to exist in Northern Indians who had not yet any occasion to inhale much air polluted by car exhausts and industrial fumes. I feel therefore inclined to suspect the latter factors as potential carcinogens. Two cases of lung cancer have been reported from Chesterfield Inlet. Fifteen cases with malignant tumours have been reported since 1950 from this relatively small group in the Southern Central Arctic, comprising only about 10% of Canada's Eskimos, yet accounting for more malignancies than the remaining 90% so far! The 15 cases were classified as: 5 parotid, 2 oesophagus, 2 lung, 2 rodent ulcers, 1 bladder, 1 gallbladder, 1 sigmoid, 1 intestinal (non-specified) carcinoma.¹³ Of a total of 24 Eskimos with neoplastic diseases seen from 1950 till the beginning of 1958, 12 came originally from the Eskimo Point-Padlei district. This barren area is populated by fewer than 500 Eskimos, predominantly inland or Caribou Eskimos. The incidence of tumours in this small isolated group is 20 times that in the rest of the Canadian Eskimos,

and this incidence is highly significant even if the numbers involved are small. I am inclined to look to local factors for an explanation. The northern lights (aurora borealis) with known electromagnetic and unknown radioactive (?) or biological (?) effects in our ionosphere and atmosphere are most frequent and of greatest intensity just north of the 60° parallel and roughly around the line Winnipeg-Prince of Wales Island (area of the north magnetic pole). This is the area populated by the Caribou Eskimos. With great hesitation and only in the hope of stirring up an investigation of great theoretical and even possible practical interest (because of the mining and defence developments in that area) do I express this fantastic-sounding possibility. Inbreeding in such small, isolated groups may account for potentiation of pathological genes. A relative preponderance of tumours due to *embryological development errors* seems to exist in Eskimos. We saw one mixed tumour and one carcinoma of the parotid in the Charles Camsell Hospital and one dermoid cyst of the ovary in an Eskimo who also had a cancer of the vagina. One proven case of hypernephroma was also seen. (See also below—relative frequency of malformations.)

Stomach cancer is extremely rare, while, in contrast, *oesophageal carcinoma* is commoner. One old Mackenzie-delta Eskimo was suspected clinically of having an oesophageal tumour, but on operation this was found to be histologically a carcinoma of the cardia invading the oesophagus. From Eskimo Point (west coast of Hudson Bay), two oesophageal cancers were reported.

Cervical carcinoma is probably the only major form of cancer which has no definitely lower incidence in Eskimos and Indians. I have seen three cases in the North; two of these were in Eskimos. Malignant diseases other than carcinoma include: one case of malignant chorionepithelioma in a young Eskimo woman from the Hudson Strait,¹² and one case of malignant lymphogranuloma in an Eskimo from Aklavik (of Alaskan origin).

MALFORMATIONS

Malformations, such as harelip, cleft palate or coloboma, occur, in my opinion, in the Eastern and Central Arctic more frequently than would be expected in the same numbers of whites. In the Pangnirtung (E 6-) district with a population of 650-700 Eskimos, I counted three living Eskimos with *cleft palate* and was told of about two more babies who had died with extensive cleft palate and/or harelip within the last 20 years. The true incidence may be even higher. Most Eskimo babies with such deformities naturally do not survive, and the parents tend to withhold information about them for fear of ridicule. I saw one more case in the Central Arctic and one in South Baffin Island, and heard about several other cases there.

I have collected family histories of all cases with malformations and with abnormalities of the third stage of labour which I saw or had definite knowledge of in the E 6- district. My Eskimo guide instigated this study by bringing me a woman for delivery with the remark that all the women of the family had trouble in expelling the

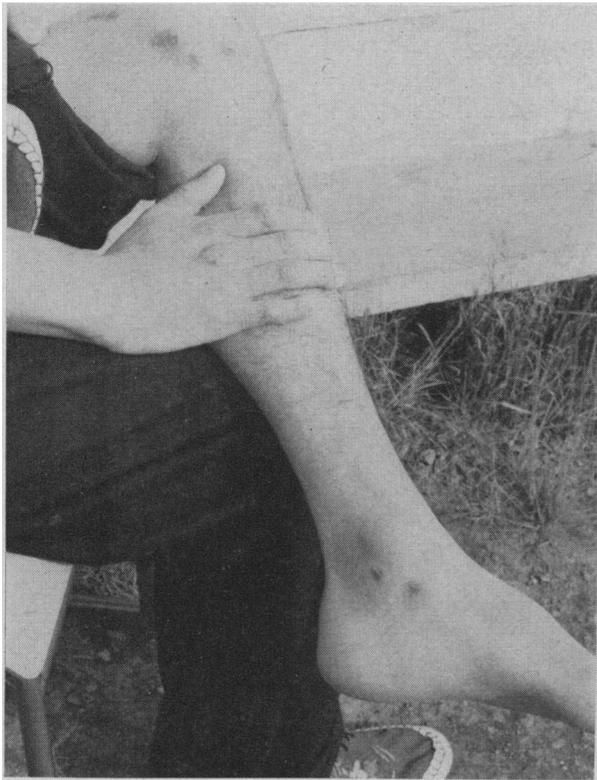


Fig. 3.—F.W., a half-Eskimo suffering from polyarthritis, showing his scars from the "water-letting" jack-knife treatment, performed by his Eskimo uncle, who was an old "Angakok", i.e. medicine-man.

placenta. Indeed, her mother and two maternal aunts had died of post-partum hæmorrhage and the patient herself had almost bled to death after an incomplete abortion. Her sister had also had a retained placenta after the delivery of a boy with urogenital abnormalities. Her youngest sister and one cousin had cleft palates. Two children with cleft palates had died as babies in this family group.

I removed her placenta, which was partially a placenta accreta, with difficulty.

Retention of the placenta occurs surprisingly often in Eskimos, and many old Eskimo women have experience with manual removal.

I remember old Asheva telling me the story of the delivery of her adopted son Isayasy, who had a cleft palate and whose mother had a retained placenta. Asheva demonstrated with her fingers how she had to shear the placenta from the uterine wall. I could not help but stare at her long, black fingernails and exclaim: "You went into the uterus like that?!" She glanced up surprised, noticed what I was staring at, and smiled: "Eskimo not that dumb, knows how soft womb inside; chews nails off, before going in!"

Hildes counted four persons with *iris colobomata* in 1200 Eastern Arctic Eskimos in 1957.¹¹ Two of these occurred in one family. I saw one additional case in Coppermine. No coloboma of the retina was seen. We saw in 1955 two cases of *hereditary optic atrophy* in an Eskimo camp on the Hudson Strait. Myopia is rare, astigmatism more frequent. The latter may sometimes be caused by corneal scarring due to phlyctenular disease. Glaucoma is

unknown in pure-blooded Indians.²⁴ I observed, however, two cases of primary *glaucoma* in Eskimos.

Epilepsy is often seen in Eskimos. The common familial incidence suggests that most cases are idiopathic, but in a few cases cerebral tuberculomata have been demonstrated in the Charles Camsell Hospital. Not all reported "fits" are due to epilepsy. Hysterical seizures are not infrequently exhibited by Eskimos, as by other primitive peoples, as a primitive form of psychomotor reaction. In Eskimo children our first consideration is tuberculous meningitis.

Congenital dislocation of the hip has not yet been observed in Eskimos, though relatively frequent in Cree Indians around Island Lake, Manitoba,²⁵ and in one band of Alaskan Indians,⁵ in Navaho and several other Indian tribes. Gray²⁵ is inclined to explain the markedly different incidence of this abnormality in American natives at least partly by the fact that young Eskimos spend most of their life up to three years on the back of their mothers with the legs flexed, abducted and outwardly rotated. On the other hand, he found the papoose board, which immobilizes the legs in the position most apt to manifest a tendency for dislocation, still used by the Manitoba Indians with the highest incidence of congenital dislocation of the hip.

Congenital heart disease was seen occasionally. Hildes¹¹ described two cases in 1200 Eskimos examined. I have seen another Eskimo from the Central Arctic, and one "blue baby" with congenital heart disease died near Pangnirtung.

Rheumatic heart disease does occur, although probably less frequently than in whites, due to lesser exposure to hæmolytic streptococci. In more than 4000 Eskimos I saw two girls with mitral stenosis, one man with a cerebral embolus secondary to rheumatic valvular disease, and one man with severe heart failure probably due to rheumatic heart disease. One young Eskimo was recently seen in Camsell Hospital with aortic insufficiency. Only once did I see a full-blown picture of acute rheumatic fever, and that was in a part-white boy. His uncle, an old "Angakok" (medicine man), had "drained the water" from the swollen knee- and ankle-joints with the hunting knife (see Fig. 3). Thirty years earlier, the Angakok's surgical skill was better placed, when he relieved an acute bladder retention of our boy's grandfather, an old white trapper, by cystotomy. *Rheumatoid arthritis* is uncommon in pure Eskimos, but is often seen in white trappers and somewhat less frequently in half-breeds in the Arctic.

Malocclusion due to prognathism of the lower jaw is common in Western Arctic Eskimos, especially those of part-Alaskan origin (see Fig. 4). Anthropological factors, namely mixture of mongoloid-brachycephalic with primordial extremely dolichocephalic race elements, may be responsible for this as well as for the primordial, rectangular configuration of the dentures, seen not infrequently in Eastern Arctic Eskimos, as opposed to our round dental arches. *Dental caries* occurs in relation to the consumption of flour and sugar and is there-

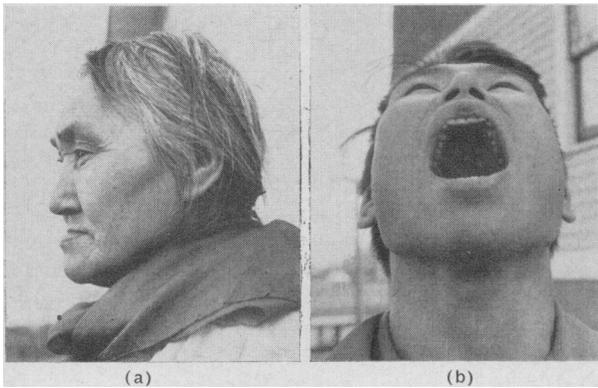


Fig. 4.—Dental abnormalities due to anthropological causes: (a) old Susie Tuma, Aklavik, of part-Alaskan origin, showing malocclusion due to short (mongoloid) maxilla and large (primordial) mandibula.

Teeth out of line are often seen in Alaskan and Mackenzie-delta Eskimos, being seen less frequently as one moves eastwards. In the Eastern Arctic, jaws are mighty and are long as well as large. In the East, the maxilla usually fits the mandibula well, and prominent canine teeth (and strong chewing muscles?) not infrequently cause a deviation in the dentures from the arch form to a rectangular alignment as seen in (b), a young Eskimo from the Eastern Central Arctic.

fore very common, e.g. around Aklavik. Eskimo teeth are often worn down by chewing raw meat, fish and whaleskin. This process is accelerated in women by the daily chore of chewing skin clothing and sealskin boots to make them pliable again after drying. These teeth, deprived of their protective enamel, nevertheless keep healthy into old age as long as no carbohydrates and their fermented acids touch them (see Fig. 5).

TRAUMATIC DISEASES DUE TO CLIMATIC AND LOCAL CONDITIONS

Eskimos, Indians and whites alike suffer in the Arctic and Subarctic regions from frequent and often severe *nosebleeding*. This is probably caused by the extremely cold and absolutely dry air. The nasal mucosa develops many telangiectases, which tear easily with the damaged epithelium. I found the application of a covering layer of Vaseline or blubber a simple and effective prophylaxis.

Drowning of children and, rarely, also of hunters happens every summer in the labyrinth of channels and lakes in the Mackenzie delta. The loss of hunters is greater in the Eastern Arctic, where most are lost in winter and spring, whilst hunting on the ice-flow edge, which may break off in sudden storms. Marooned on drifting floes, Eskimos have endured days and in some cases even weeks of starvation and exposure until their ice floe drifted ashore—or perished in the open sea. The greater loss of men used to balance the greater sacrifices of young girls in starvation times. Nowadays, higher tuberculosis morbidity and mortality of women (lessened resistance in gestation and lactation periods and poorer nutrition) seem to have established a new balance of sexes.

Severe frostbite and death due to freezing are uncommon in the Western Arctic. Sudden blizzards there have probably trapped more whites than natives in the last decades. Frost damage is of greater importance in the moist-cold Eastern Arctic, where with the advent of the rifle the dangerous hunting on the floe-edge has superseded the tedious hunting on breathing holes.

The incredible physical endurance, patient fortitude and resourcefulness of Arctic hunters is probably best shown by relating the story of my first patient with frozen feet, who was brought to the Pangnirtung Hospital on December 2, 1956. A sudden storm had broken large floes off the young shore-ice near a camp on the west coast of Cumberland Sound. Ahme, about 18, and Aoyalo, about 40, were driven across the northern part of the Sound. The next day, they tried to make their way over thin and broken floes to the eastern shore. Aoyalo went ahead, feeling his way with the harpoon rod; Ahme followed with the dogsled. The ice broke under the sled and Ahme tumbled into the water. He eventually regained firm ice after breaking several times through thin layers. But as there was not enough snow on the new ice on which to roll himself and his clothes dry, they ran several miles to land, where Aoyalo finally found suitable snow for an igloo. Aoyalo had returned only a few months previously after having been confined for seven years in Dartmouth mental hospital and it took him much too long to build the igloo. Ahme kept running in circles until he fell exhausted on the snow. His water-filled boots and already painless feet soon froze rock-hard in the 20° F. below zero blizzard. Aoyalo eventually pulled him into the completed igloo and began to thaw his frozen boots over the primus stove. He then thawed the frozen feet on his own body beneath his skin clothing. They had no dry clothes to change into, no sleeping bags and no food reserves, as they had been hunting just before their home camp. After an hour the last of the kerosene was burnt and for the next two nights and a day Aoyalo tried to drive Ahme and himself around, stamping the snow in order to avoid freezing to death. There was nothing but snow to eat. When the blizzard subsided the second morning, Aoyalo lashed the now completely lethargic young fellow on his sled and hurried as fast as possible over rocky

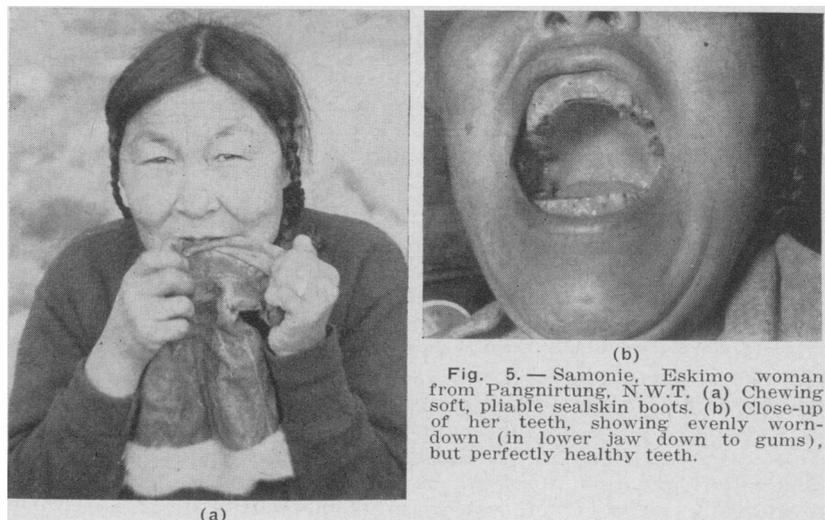


Fig. 5.—Samonie, Eskimo woman from Pangnirtung, N.W.T. (a) Chewing soft, pliable sealskin boots. (b) Close-up of her teeth, showing evenly worn-down (in lower jaw down to gums), but perfectly healthy teeth.

hills and rough sea-ice to the next Eskimo camp. From there, new teams rushed them to Pangnirtung, but, by then, the greater part of the right foot and a small portion of the left were gangrenous.

More fortunate was a 17-year-old Eskimo. He had broken through the new ice on the Pangnirtungfjord just five or six miles from the post. Shaking off his mitts he had worked himself with his fingers up on to the smooth new ice and then run for his life.

But despite such fortitude, endurance and ingenuity, many hunters never return to tell their stories. There are no headlines and no heroic speeches. Elata summed up the fates of many husbands and sons of the Baffinland Eskimos, when I asked her about her first husband: "AUDLAUKPOK; TIKELAUNGILAK;—AYUNAMAT." (He went out hunting; he did not come back;—there is nothing one can do about it.)

SUMMARY

Our northland and its native population are rapidly growing in importance to Canada and the Western World. Lasting progress can only be based on a healthy population. As in other primitive peoples, the impact of civilization was at first rather destructive for our northern natives, destroying or changing their basis of existence, their social structure and cultural traditions, and bringing them new diseases, for which they had not developed any resistance in their isolation.

Tuberculosis, favoured by climatic and housing conditions, became the main plague, killing whole families and entire tribes. The prevailing forms of tuberculosis, other infectious diseases and immunity problems are discussed. Immense difficulties are met in bringing help to the scattered population in the vast, trackless country. Great progress, however, has been made by the Indian and Northern Health Services, particularly in the fight against tuberculosis.

Of special interest to our modern society, which suffers increasingly from diseases of civilization, is the absence or significantly different incidence of these diseases among primitive peoples. The Eskimos, who are now subjected to abrupt changes in their nutrition, occupation and their entire way of life, present us with unique opportunities to study and differentiate the effects of these environmental factors from hereditary characteristics. An attempt was, therefore, made to survey pertinent data, collected from the main hospitals treating Eskimos, and during four years of field service in the Canadian Arctic.

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